Wisconsin Power and Light Company

Smart Grid Distribution Automation

Abstract

Wisconsin Power and Light Company's (WPL) smart grid distribution automation project is designed to improve distribution system efficiency and reliability while lowering operations and maintenance costs. WPL is deploying a new centralized energy management system and adding intelligent communication and control modules to approximately 40% of its distribution capacitor banks. The capacitor banks selected for upgrade were determined based on coverage area and load usage. Project benefits include reducing distribution energy losses by improving power factor and reducing distribution operations and maintenance costs. WPL also expects to reduce vehicle fuel consumption and associated greenhouse gas emissions by reducing truck rolls through automation.

At-A-Glance

Recipient: Wisconsin Power and Light Company

State: Wisconsin

NERC Region: Midwest Reliability Organization

Total Budget: $6,377,489

Federal Share: $3,165,704

Project Type: Electric Distribution Systems

Equipment

- **Distribution Automation Equipment for Approximately 298 out of 906 Circuits**
  - **Distribution Automation Communications Network**
  - **Automated Capacitors**

Targeted Benefits

- **Reduced Costs from Equipment Failures and Distribution Line Losses**
- **Reduced Greenhouse Gas and Criteria Pollutant Emissions**
- **Reduced Operating and Maintenance Costs**
- **Reduced Truck Fleet Fuel Usage**

Smart Grid Features

Communications infrastructure involves tying together a centralized control system with intelligent capacitor bank controllers. The communications system provides WPL better control over the distribution system and allows for improved monitoring of the distribution system assets. The increased visibility reduces operations and maintenance costs and improves reliability.

Distribution system energy efficiency improvements involve integration of the newly deployed automated capacitor banks and volt ampere reactive control system (VVCS). Based on distribution load data, the VVCS adjusts capacitor bank settings in response to changing grid conditions. The capacitors improve voltage and volt ampere reactive control, power quality, and increase distribution capacity by reducing energy losses on the distribution system.

Timeline

Key Milestones	Target Dates
Distribution automation asset deployment begins	Q2 2011
Distribution automation asset deployment complete	Q1 2013

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